

REMARKS

Claims 1-17, 19-29, and 31-33 are currently pending in the subject application and are presently under consideration. Claims 1, 14, 19, 21, 22, 24, 26, 27, 28 and 29 have been amended as shown on pages 2-9 of the Reply. Claims 18 and 30 have been cancelled herein. Applicants' representative thanks the Examiner for the teleconference conducted on July 11, 2007. The merits of the claims and rejections under 35 U.S.C. §101 were discussed.

In addition, applicant's representative notes with appreciation the indication that claim 18 would be allowable if recast in independent form to include all limitations of respective base claims and any intervening claims. Favorable reconsideration of the subject patent application is respectfully requested in view of the comments and amendments herein.

I. Rejection of Claims 1-13 Under 35 U.S.C. §101

Claims 1-13 stand rejected under 35 U.S.C. §101 because the claimed invention is directed to non-statutory subject matter. Claim 1 has been amended herein. In view of the amendments, it is requested that this rejection should be withdrawn.

II. Rejection of Claims 14-28 Under 35 U.S.C. §101

Claims 14-28 stand rejected under 35 U.S.C. §101 because the claimed invention falls outside of the statutory categories. Withdrawal of this rejection is respectfully requested for at least the following reasons.

Because the claimed process applies the Boolean principle [abstract idea] *to produce a useful, concrete, tangible result* ... on its face the claimed process comfortably falls within the scope of §101. *AT&T Corp. v. Excel Communications, Inc.*, 172 F.3d 1352, 1358. (Fed.Cir. 1999) (Emphasis added); *See State Street Bank & Trust Co. v. Signature Fin. Group, Inc.*, 149 F.3d 1368, 1373, 47 USPQ2d 1596, 1601 (Fed.Cir.1998).

The claimed invention produces a useful and tangible result relating to image compression. Independent claims 14-28 illustrate that elements within such claims are components associated with a computer. In particular, amended claim 14 is directed towards a computer executable method for facilitating data compression, comprising receiving an N-

dimensional image, where N is any integer from one to infinity; and utilizing, at least in part, locally-adaptive, lossless palettization to *facilitate compression of the N-dimensional image*.

In the Office Action dated May 18, 2007, the Examiner contends that the subject invention is non-statutory. Applicant's representative respectfully avers to the contrary. The invention as claimed enables data to be compressed, and that allows information to be transmitted with less bandwidth and stored in less space than uncompressed data. These include functional descriptive material within a computer, thereby rendering it structurally and functionally interrelated to the computer and is therefore directed to statutory subject matter. Accordingly, this rejection should be withdrawn.

III. Rejection of Claim 30 Under 35 U.S.C. §101

Claim 30 stands rejected under 35 U.S.C. §101 because the claimed invention is directed to non-statutory subject matter. Claim 30 has been cancelled herein. Accordingly, this rejection is now moot and should be withdrawn.

IV. Rejection of Claims 1, 2, 14, 15, 29 and 30-33 Under 35 U.S.C. §102(b)

Claims 1, 2, 14, 15, 29 and 30-33 stand rejected under 35 U.S.C. §102(b) as being anticipated by Ratnakar (US 2002/000143 A1). This rejection should be withdrawn for at least the following reasons. The subject independent claims have been amended herein to clarify aspects of the invention believed to be allowable.

A single prior art reference anticipates a patent claim only if it *expressly or inherently describes each and every limitation set forth in the patent claim*. *Trintec Industries, Inc. v. Top-U.S.A. Corp.*, 295 F.3d 1292, 63 USPQ2d 1597 (Fed. Cir. 2002); *See Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). *The identical invention must be shown in as complete detail as is contained in the ... claim*. *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989) (emphasis added).

Applicant's claimed invention relates to image compression, and more particularly to systems and methods for dynamic, locally-adaptive, lossless palettization of color and grayscale images. To this end, amended independent claim 1 recites *a computer-implemented system that*

facilitates data compression, comprising the following computer executable components: a component that receives an N-dimensional image, where N is any integer from one to infinity; and a compression component that utilizes, at least in part, locally-adaptive, lossless palettization to facilitate compression of the N-dimensional image, wherein the lossless palettization comprises initializing an L size last recently used (LRU) buffer; splitting the N-dimensional image into M x O size macroblocks, where M and O each represent any integer from one to infinity; checking each macroblock line-by-line and pixel-by-pixel; setting masking bits if a line matches a previous line; setting masking bits if a pixel matches a previous pixel; creating a list of all pixel characteristics utilized in non-matching macroblock lines; encoding macroblock lines "as is" if pixel characteristics in non-matching macroblock lines is greater than a threshold value related to the pixel characteristics; encoding a list of used pixel characteristics utilizing, if possible, an index value from the LRU buffer instead of actual characteristic encoding; encoding a sequence of all pixels from non-matching macroblock lines by substituting pixel characteristics with its index value from the list of used pixel characteristics; and adding pixel characteristics from the list of used pixel characteristics to the LRU buffer. Independent claims 14 and 29 recite similar features. Ratnakar fails to disclose or suggest such novel features.

Ratnakar relates to an image compression/decompression technique. A digitized image is segmented into a plurality of blocks of data, then compressed using a wavelet technique. However, Ratnakar is silent regarding claimed compression component. Accordingly, this rejection should be withdrawn.

V. Rejection of Claims 1-3, 6, 9, 10, 14 and 15 Under 35 U.S.C. §102(b)

Claims 1-3, 6, 9, 10, 14 and 15 stand rejected under 35 U.S.C. §102(b) as being anticipated by Po *et al.* ("Block address predictive colour quantization image Compression"). This rejection should be withdrawn for at least the following reasons. The subject independent claims have been amended herein to clarify aspects of the invention believed to be allowable.

Applicant's claimed invention relates to image compression, and more particularly to systems and methods for dynamic, locally-adaptive, lossless palettization of color and grayscale images. In particular, independent claims 1, 14 and 29 recite similar limitations, namely *a computer-implemented system that facilitates data compression, the lossless palettization*

comprises initializing an L size last recently used (LRU) buffer; splitting the N-dimensional image into M x O size macroblocks, where M and O each represent any integer from one to infinity; checking each macroblock line-by-line and pixel-by-pixel; setting masking bits if a line matches a previous line; setting masking bits if a pixel matches a previous pixel; creating a list of all pixel characteristics utilized in non-matching macroblock lines; encoding macroblock lines "as is" if pixel characteristics in non-matching macroblock lines is greater than a threshold value related to the pixel characteristics; encoding a list of used pixel characteristics utilizing, if possible, an index value from the LRU buffer instead of actual characteristic encoding; encoding a sequence of all pixels from non-matching macroblock lines by substituting pixel characteristics with its index value from the list of used pixel characteristics; and adding pixel characteristics from the list of used pixel characteristics to the LRU buffer. Po *et al.* is silent regarding such novel aspects of the subject claims.

Po *et al.* relates to block address predictive color quantisation image compression. At the cited portions, an input image is divided into blocks and color quantized with color palette ordering and adaptive color level selection. The palettised image sub-block is then encoded using APCQC while the prediction error is encoded using run-length Huffman coding techniques. However, Po *et al.* is silent regarding the aforementioned features recited by the subject claims. Accordingly, this rejection should be withdrawn

VI. Rejection of Claims 1, 2, 14 and 15 Under 35 U.S.C. §102(b)

Claims 1, 2, 14 and 15 stand rejected under 35 U.S.C. §102(b) as being anticipated by Sharpe *et al.* ("JPEG 2000 options for document image compression"). This rejection should be withdrawn for at least the following reasons. The subject independent claims have been amended herein to clarify aspects of the invention believed to be allowable.

Applicant's claimed invention relates to image compression, and more particularly to systems and methods for dynamic, locally-adaptive, lossless palettization of color and grayscale images. In particular, independent claims 1, 14 and 29 recite similar limitations, namely *a computer-implemented system that facilitates data compression.... the lossless palettization comprises initializing an L size last recently used (LRU) buffer; splitting the N-dimensional image into M x O size macroblocks, where M and O each represent any integer from one to infinity; checking each macroblock line-by-line and pixel-by-pixel; setting masking bits if a*

line matches a previous line; setting masking bits if a pixel matches a previous pixel; creating a list of all pixel characteristics utilized in non-matching macroblock lines; encoding macroblock lines “as is” if pixel characteristics in non-matching macroblock lines is greater than a threshold value related to the pixel characteristics; encoding a list of used pixel characteristics utilizing, if possible, an index value from the LRU buffer instead of actual characteristic encoding; encoding a sequence of all pixels from non-matching macroblock lines by substituting pixel characteristics with its index value from the list of used pixel characteristics; and adding pixel characteristics from the list of used pixel characteristics to the LRU buffer. Sharpe *et al.* is silent regarding such novel aspects of the subject claims.

Sharpe *et al.* relates to JPEG 2000 options for document image compression. At the cited portions, Sharpe *et al.* discloses support of palettized images through the optional JP2 file format where an optional palette associates a color value with each row of the table, each row represents an index value and the entropy coder is used to losslessly compress the index values. However, Sharpe *et al.* is silent regarding the aforementioned features recited by the independent claims. Accordingly, this rejection should be withdrawn

VII. Rejection of Claims 1, 2, 14 and 15 Under 35 U.S.C. §102(a)

Claims 1, 2, 14 and 15 stand rejected under 35 U.S.C. §102(a) as being anticipated by A.J. Pinto *et al.* (“JPEG 2000 coding of color-quantized images”). This rejection should be withdrawn for at least the following reasons. The subject independent claims have been amended herein to clarify aspects of the invention believed to be allowable.

Applicant’s claimed invention relates to image compression, and more particularly to systems and methods for dynamic, locally-adaptive, lossless palettization of color and grayscale images. In particular, independent claims 1, 14 and 29 recite similar limitations, namely *a computer-implemented system that facilitates data compression.... the lossless palettization comprises initializing an L size last recently used (LRU) buffer; splitting the N-dimensional image into M x O size macroblocks, where M and O each represent any integer from one to infinity; checking each macroblock line-by-line and pixel-by-pixel; setting masking bits if a line matches a previous line; setting masking bits if a pixel matches a previous pixel; creating a list of all pixel characteristics utilized in non-matching macroblock lines; encoding macroblock lines “as is” if pixel characteristics in non-matching macroblock lines is greater*

than a threshold value related to the pixel characteristics; encoding a list of used pixel characteristics utilizing, if possible, an index value from the LRU buffer instead of actual characteristic encoding; encoding a sequence of all pixels from non-matching macroblock lines by substituting pixel characteristics with its index value from the list of used pixel characteristics; and adding pixel characteristics from the list of used pixel characteristics to the LRU buffer. A.J. Pinto *et al.* is silent regarding such novel aspects of the subject claims.

A.J. Pinto *et al.* relates to JPEG 2000 coding of color-quantized images. At the cited portions, A.J. Pinto *et al.* discloses JPEG 2000 lossless compression results of reordered index images with the use of local histogram packing, which implies partitioning of the image into a set of disjoint regions. However, A.J. Pinto *et al.* is silent regarding the aforementioned features recited by the subject claims. Accordingly, this rejection should be withdrawn

VIII. Rejection of Claims 4 and 5 Under 35 U.S.C. §103(a)

Claims 4 and 5 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Po *et al.* and Sharpe *et al.* It is respectfully submitted that this rejection should be withdrawn for the following reasons. Po *et al.* and Sharpe *et al.*, individually or in combination, do not teach or suggest each and every element set forth in the subject claims.

The subject claims depend from independent claim 1. In particular, as discussed *supra*, Po *et al.* is silent with respect to the claimed limitation of *the lossless palettization comprises initializing an L size last recently used (LRU) buffer; splitting the N-dimensional image into M x O size macroblocks, where M and O each represent any integer from one to infinity; checking each macroblock line-by-line and pixel-by-pixel; setting masking bits if a line matches a previous line; setting masking bits if a pixel matches a previous pixel; creating a list of all pixel characteristics utilized in non-matching macroblock lines; encoding macroblock lines "as is" if pixel characteristics in non-matching macroblock lines is greater than a threshold value related to the pixel characteristics; encoding a list of used pixel characteristics utilizing, if possible, an index value from the LRU buffer instead of actual characteristic encoding; encoding a sequence of all pixels from non-matching macroblock lines by substituting pixel characteristics with its index value from the list of used pixel characteristics; and adding pixel characteristics from the list of used pixel characteristics to the LRU buffer as*

recited by the subject claims. Sharpe *et al.* fails to compensate for the aforementioned deficiencies of Po *et al.*

In view of at least the foregoing it is readily apparent that Po *et al.* and Sharpe *et al.* either alone or in combination do not teach or suggest each and every element set forth in the applicant's subject claims. Accordingly this rejection should be withdrawn.

IX. Rejection of Claim 7 Under 35 U.S.C. §103(a)

Claim 7 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Po *et al.* and W. Zeng *et al.* ("An efficient color re-indexing scheme for palette-based compression"). It is respectfully submitted that this rejection should be withdrawn for the following reasons. Po *et al.* and W. Zeng *et al.*, individually or in combination, do not teach or suggest each and every element set forth in the subject claims.

The subject claim depends from independent claim 1. In particular, as discussed *supra*, Po *et al.* is silent with respect to the claimed limitation of *the lossless palettization comprises initializing an L size last recently used (LRU) buffer; splitting the N-dimensional image into M x O size macroblocks, where M and O each represent any integer from one to infinity; checking each macroblock line-by-line and pixel-by-pixel; setting masking bits if a line matches a previous line; setting masking bits if a pixel matches a previous pixel; creating a list of all pixel characteristics utilized in non-matching macroblock lines; encoding macroblock lines "as is" if pixel characteristics in non-matching macroblock lines is greater than a threshold value related to the pixel characteristics; encoding a list of used pixel characteristics utilizing, if possible, an index value from the LRU buffer instead of actual characteristic encoding; encoding a sequence of all pixels from non-matching macroblock lines by substituting pixel characteristics with its index value from the list of used pixel characteristics; and adding pixel characteristics from the list of used pixel characteristics to the LRU buffer* as recited by the subject claims. W. Zeng *et al.* relates to an efficient color re-indexing scheme for palette based compression, and fails to compensate for the aforementioned deficiencies of Po *et al.*

In view of at least the foregoing it is readily apparent that Po *et al.* and W. Zeng *et al.* either alone or in combination do not teach or suggest each and every element set forth in the applicant's subject claim. Accordingly this rejection should be withdrawn.

X. Rejection of Claim 8 Under 35 U.S.C. §103(a)

Claim 8 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Po *et al.* and W. Zeng *et al.* (“An efficient color re-indexing scheme for palette-based compression”), and further in combination with Su *et al.* (“Hardware efficient updating technique for LZW CODEC design”). It is respectfully submitted that this rejection should be withdrawn for the following reasons. Po *et al.* and W. Zeng *et al.*, individually or in combination, do not teach or suggest each and every element set forth in the subject claims.

The subject claim depends from independent claim 1. In particular, as discussed *supra*, Po *et al.* does not teach all features of amended claim 1. W. Zeng *et al.* fails to compensate for the aforementioned deficiencies of Po *et al.*

In view of at least the foregoing it is readily apparent that Po *et al.* and W. Zeng *et al.* either alone or in combination do not teach or suggest each and every element set forth in the applicant’s subject claim. Accordingly this rejection should be withdrawn.

XI. Rejection of Claims 11 and 12 Under 35 U.S.C. §103(a)

Claims 11 and 12 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Ratnakar and Inoue *et al.* (US 5,787,471). It is respectfully submitted that this rejection should be withdrawn for the following reasons. Ratnakar *et al.* and Inoue *et al.*, individually or in combination, do not teach or suggest each and every element set forth in the subject claims.

The subject claims depend from independent claim 1. In particular, as discussed *supra*, *et al.* is silent with respect to the claimed limitation of *the lossless palettization comprises initializing an L size last recently used (LRU) buffer; splitting the N-dimensional image into M x O size macroblocks, where M and O each represent any integer from one to infinity; checking each macroblock line-by-line and pixel-by-pixel; setting masking bits if a line matches a previous line; setting masking bits if a pixel matches a previous pixel; creating a list of all pixel characteristics utilized in non-matching macroblock lines; encoding macroblock lines “as is” if pixel characteristics in non-matching macroblock lines is greater than a threshold value related to the pixel characteristics; encoding a list of used pixel characteristics utilizing, if possible, an index value from the LRU buffer instead of actual characteristic encoding; encoding a sequence of all pixels from non-matching macroblock lines by substituting pixel characteristics with its index value from the list of used pixel characteristics;*

and adding pixel characteristics from the list of used pixel characteristics to the LRU buffer as recited by the subject claims. Inoue *et al.* relates to a cache memory management apparatus, and fails to compensate for the aforementioned deficiencies of Ratnakar *et al.*

In view of at least the foregoing it is readily apparent that Ratnakar *et al.* and Inoue *et al.* either alone or in combination do not teach or suggest each and every element set forth in the applicant's subject claims. Accordingly this rejection should be withdrawn.

XII. Rejection of Claim 13 Under 35 U.S.C. §103(a)

Claim 13 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Ratnakar and Pan *et al.* (US 2003/0189576 A1). It is respectfully submitted that this rejection should be withdrawn for the following reasons. Ratnakar *et al.* and Pan *et al.*, individually or in combination, do not teach or suggest each and every element set forth in the subject claims.

The subject claim depends from independent claim 1. In particular, as discussed *supra*, Ratnakar *et al.* is silent with respect to the claimed limitation of *the lossless palettization comprises initializing an L size last recently used (LRU) buffer; splitting the N-dimensional image into M x O size macroblocks, where M and O each represent any integer from one to infinity; checking each macroblock line-by-line and pixel-by-pixel; setting masking bits if a line matches a previous line; setting masking bits if a pixel matches a previous pixel; creating a list of all pixel characteristics utilized in non-matching macroblock lines; encoding macroblock lines "as is" if pixel characteristics in non-matching macroblock lines is greater than a threshold value related to the pixel characteristics; encoding a list of used pixel characteristics utilizing, if possible, an index value from the LRU buffer instead of actual characteristic encoding; encoding a sequence of all pixels from non-matching macroblock lines by substituting pixel characteristics with its index value from the list of used pixel characteristics; and adding pixel characteristics from the list of used pixel characteristics to the LRU buffer* as recited by the subject claims. Pan *et al.* relates to a method for displaying higher color resolution on a hand held LCD device, and fails to compensate for the aforementioned deficiencies of Ratnakar *et al.*

In view of at least the foregoing it is readily apparent that Ratnakar *et al.* and Pan *et al.* either alone or in combination do not teach or suggest each and every element set forth in the applicant's subject claims. Accordingly this rejection should be withdrawn.

XIII. Rejection of Claim 16 Under 35 U.S.C. §103(a)

Claim 16 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Ratnakar and W. Zeng *et al.* (“An efficient color re-indexing scheme for palette-based compression”). It is respectfully submitted that this rejection should be withdrawn for the following reasons. Ratnakar *et al.* and W. Zeng *et al.*, individually or in combination, do not teach or suggest each and every element set forth in the subject claims.

The subject claim depends from independent claim 1. In particular, as discussed *supra*, Ratnakar *et al.* is silent with respect to the claimed limitation of *the lossless palettization comprises initializing an L size last recently used (LRU) buffer; splitting the N-dimensional image into M x O size macroblocks, where M and O each represent any integer from one to infinity; checking each macroblock line-by-line and pixel-by-pixel; setting masking bits if a line matches a previous line; setting masking bits if a pixel matches a previous pixel; creating a list of all pixel characteristics utilized in non-matching macroblock lines; encoding macroblock lines “as is” if pixel characteristics in non-matching macroblock lines is greater than a threshold value related to the pixel characteristics; encoding a list of used pixel characteristics utilizing, if possible, an index value from the LRU buffer instead of actual characteristic encoding; encoding a sequence of all pixels from non-matching macroblock lines by substituting pixel characteristics with its index value from the list of used pixel characteristics; and adding pixel characteristics from the list of used pixel characteristics to the LRU buffer* as recited by the subject claims. W. Zeng *et al.* fails to compensate for the aforementioned deficiencies of Ratnakar *et al.*

In view of at least the foregoing it is readily apparent that Ratnakar *et al.* and W. Zeng *et al.* either alone or in combination do not teach or suggest each and every element set forth in the applicant’s subject claims. Accordingly this rejection should be withdrawn.

CONCLUSION

The present application is believed to be in condition for allowance in view of the above comments and amendments. A prompt action to such end is earnestly solicited.

In the event any fees are due in connection with this document, the Commissioner is authorized to charge those fees to Deposit Account No. 50-1063 [MSFTP546US].

Should the Examiner believe a telephone interview would be helpful to expedite favorable prosecution, the Examiner is invited to contact applicant's undersigned representative at the telephone number below.

Respectfully submitted,

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